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STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

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March 18, 1985

Mr. Kenneth L. Alkema, Director
Division of Environmental Health
3266 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Alkema:

Re: Kennecott Hydrogeologic Study Comments

The Division staff has reviewed the two reports prepared by Kennecott describing the five year study of the impacts on ground water resulting from mining activies in the Bingham Canyon area, Salt Lake County. Several major comments on these reports are presented in summary form in the body of this letter, while a detailed presentation of comments, with references to the individual reports, is presented in the attachment.

First, let me say that the intentions of Kennecott in attempting this study in an open manner are greatly appreciated. Many problems and miscommunications can occur when potential problems are kept in the dark.

The first major concern raised by the Division's hydrology and geology staff was the limited understanding of the local subsurface geologic and hydrologic conditions. The works, which are referenced in both reports, are, at best, regional studies and are not suited to evaluating the site-specific ground water flow patterns and conditions. The Division strongly encourages that Kennecott further evaluate the local geology to provide a good physical model of subsurface conditions from which to develop a consistant model of the ground water regime.

The differences raised, in the reports and in the February Technical Committee meeting, regarding the location at which separation of the shallow, unconfined and the deep, confined aquifers occurs, is also a concern. Unless this can be identified, questions will continue to be raised regarding the type of system that exists in the study area and the zones which must be monitored to evaluate ground water contamination.

Kennecott has indicated that some of this information will be collected from the 1985 drilling program. However, when the locations of the proposed wells are considered, they encircle the main area of concern (the area from the foothills of the Oquirrh Mountains eastward to the location of well W-108). The 1985 drilling program must include sufficient boreholes to allow identification of the subsurface bed lithology and extent and evaluation of the extent of the aquifer separation.

A second major concern raised by the Division's staff was the apparent lack of background or baseline evaluation. A portion of the study is or should be to identify the contamination that occurs as a result of natural leaching versus that which occurs as a result of Kennecott's operation plus natural leaching. From our review, it did not appear that sufficient information was being or was to be collected to evaluate this question.

Kennecott should expand sampling areas to identify natural background from adjacent drainages associated with the Bingham Canyon Mining District. The study should monitor for metals and contaminants which may have naturally leached from the mineralized ore body as described in Report #1. These concentrations should be compared to the concentrations found in the Kennecott mine area and the down gradient drainages.

I greatly appreciate your providing us an opportunity to comment on these reports. If you have any questions regarding the comments provided, please call Thomas Suchoski of my staff. He will be coordinating the review efforts of our agency.

Best regards,

Dianne R. Nielson
Director

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March 18, 1985

Comments on Kennecott's
Ground Water Study

Report 1

Page 2 - Indicates that "Groundwater is used principally for industrial and irrigation purposes". What about private and city wells in the West Slopes District?

Page 7 - Natural leaching of metals may result from surface waters percolating through the mineralized rock units. When these waters enter the valley fill the metals are transported in solution.
- If this is the case, identify background water quality from all drainages which drain the Bingham Canyon Mining District.
- Also, such natural leaching would be on-going and would not be expected to change with the development of the Bingham Canyon Mining District.

Page 8 - A 5.25 year study appears to be a bit long just to provide a final environmental impact evaluation. A more appropriate time frame would be 2.5 to 3 years. A five year time frame would be acceptible if it included a mitigation plan.

Page 12 - Bingham Creek was and is used to convey mine drainage and leach fluid. No evaluation is presented as to whether Bingham Creek is a losing or gaining stream. This must be done.
- The leach collection system is stated to "prevent" loss of leach fluid. Perhaps a better word would be reduce or minimize. No evaluation is presented to demonstrate this. An evaluation of the losses from the leach fluid collection system should be considered.

Page 14 - Regional Geology is addressed adequately, but the Report does not provide a detailed description of the local geology. For a study which is attempting to determine the movement and extent of contaminants in the ground waters of the valley fill materials, very little has been presented or is proposed to be undertaken to identify the geologic controls of the ground water regime. This is a significant knowledge gap which must be addressed to be able to more fully understand the ground water system. Kennecott should delineate the subsurface structure of the valley fill deposits. Such a delineation should include:

1. Cross-sections showing the unconsolidated material beds: clays, sands and gravels.

2. Evaluation and identification, on the cross-sections of water-bearing, unsaturated, and impermeable beds within the fill materials.

Without such a process, a good representation of the physical control in the subsurface cannot be applied to the study.

Page 21 - Discussion of the natural leaching process and the Kennecot Leaching operation indicate that elevated concentrations occur around Bingham Creek. What is the difference in concentrations caused by Kennecott plus natural leaching versus the elevated concentration caused by natural leaching? This needs to be identified to determine, if any, the problem Kennecott has caused.

Page 23 - The report indicates the "Difficulty to correlate individual water-bearing zones throughout the valley fill." This may be true for the entire valley, but for the Kennecott study area this must be done to identify the potential impact on the ground water system.

Page 29 - The report indicates that the USGS has delineated the confined and shallow, unconfined aquifers beginning approximately 5 miles from the foothills of the Oquirrh Mountains. This is followed by a statement indicating Kennecott has identified a differentiation of the aquifer at a considerably lesser distance. Figures 19, 20 & 21 are presented as well-log cross-sections of the fill. A review of these cross-sections does not immediately show any real separation of aquifers any closer than five miles. Kennecott should incorporate boreholes to identify subsurface geologic conditions in the five (5) mile area eastward from the foothills of the Oquirrh Mountains.

Page 30 - The shallow, unconfined aquifer is principally composed of clay, silt, and fine sand. This is different from the texture of the upper section of the valley fill depicted in Figure 19.

- Kennecott must identify the subsurface conditions in the five (5) mile zone eastward from the Oquirrh Mountains.

Page 31 - What is the explanation for the pressure head of the deep, confined aquifer being equal to or greater than the overlying shallow aquifer in the area of evaporation ponds?

Page 42 - Few of the proposed wells will add the knowledge and information needed to answer the question of aquifer separation. Kennecott should include a number of boreholes to identify subsurface geologic controls.

Report 2

Page 3 - Point 4 under the purpose now includes numerical simulation to be used in conjunction with analytical review. This is different from Report 1; why?

Geology & Hydrology

Most all concerns raised under Report 2 were previously discussed under Report 1.

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